The Role of Services Trade in Economic Development

Philip Alege and Adeyemi Ogundipe

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By

ALEGE, Philip O. (Ph.D)*

philalege@yahoo.com
philip.alege@covenantuniversity.edu.ng
Tel: +2348056461928

and

OGUNDIPE, Adeyemi A.*

yemi_keke2001@yahoo.com
ade.ogundipe@covenantuniversity.edu.ng
Tel: +2348181249039

*Department of Economics and Development Studies,
College of Development Studies, Covenant University,
Ota. Ogun State Nigeria.

ABSTRACT

This paper is an attempt to investigate the impact of services trade on economic development of Sub-Sahara African (SSA) countries. Our analysis is based on a panel data framework over the period 1990 to 2010 covering thirty-three countries. The paper employs the endogenous growth model to examine the nonlinearities associated with services exports and services imports in the economic development process of SSA countries under consideration. The trade data was disaggregated into travel, transport and other services. The panel data constructed was estimated using ordinary pooled, fixed effects and random effects model techniques and the efficient model was selected based on the Hausman test. The paper finds that both services exports and services imports enhance economic development process. The study also indicates that labour and capital play an important role in the SSA economies.

Key words: Economic Development, Services Trade, Panel Data Analysis,

1. Introduction

To what extent can international trade in goods and services drive economic growth and development in less developed countries (LDCs)? This question has been subject of intense research over the decades. In particular, international trade in goods has taken the central stage in this endeavour. However, as the world economy is becoming increasingly service-oriented, the role of services trade has taken an upward trend. The importance of services trade in the total trade led to the General Agreement on Trade in Services (GATS) in 1995. According to Walsh (2006), GATS governs the rights and obligations of World Trade Organisation (WTO) member countries in the area of services trade. The consecutive world trade negotiations under the WTO, including the Doha Round, were designed to encourage the process of liberalization in services trade. The goal of the negotiations is to keep reducing the barriers that restrict service trade.

Available statistics shows that African countries account for meager proportion of the total world services trade. The observed data is in line with those of trade in goods. However, the importance of services trade in the overall economic development cannot be overemphasized. Just as trade in goods, services trade affect allocation of resources and welfare of nationals who are participants in such trade. The literature provides evidence that services play major role in production, distribution and marketing. Nordas (2010) asserts there are several areas in which service can help grow an economy. First, services provide direct inputs to the manufacturing process and help customers comply with government regulations in the domestic and foreign markets. Second, services in the area of transport, logistics, wholesale and retail trade facilitate the flow of products between different stages of production and to the final consumers globally. Third, R&D as a form of service helps to improve the quality of products and processes and ensure products match the taste of the consumers. Four, health and education services improve human capital. Five, financial services facilitate transactions within and across international borders and channel funds to investment to sectors of comparative advantage. Finally, adequate information and communication technology (ICT) and reliable electricity supply are necessary in order to maximize modern services trade.

The emergence of modern services has challenged the conventional development path towards advancing an economy. The conventional development path involves shifting workforce from low productivity subsistence sector to the high productivity manufacturing sector; which lends to

specialization, economies of scale essential for rising output per worker. Economies such as Japan, Taiwan, South Korea and China demonstrated that manufacturing does accelerate development. Services were viewed as possessing no potential for growth due to its inability to exploit economies of scale, deliverable only in person and not exportable. According to Baumol (1960) as countries grow richer and demand for services expands, productivity would utterly slow. Contrarily, Ghani, Goswani and Kharas (2011) argued that technology and outsourcing are enabling services to overcome its constraints. Though traditional services such as trade, hotels, restaurants and public administration remain largely constrained, but modern services such as software development, call centres, and outsourced business processes (including insurance claims to transcribing medical records) use skilled workers, exploit economies of scale and can be exported. This hereby creates more opportunities for poor countries to grow faster.

In most poor countries, services have contributed more to growth since 1980 than has industry. India, Pakistan and Sri Lanka are clear examples where productivity growth in services has outpaced that of industry. The level of productivity in these countries (measured at purchasing-power parities) is higher in services than in industry. In Nepal, productivity is three times higher in services. Services have widely become an engine for, rather than product of, development. Exports have swelled from roughly 6 percent of services output in poor countries in 1985 to almost 10 percent in 2005. Developing African economies are as well not left out of the services trade boom. Kenya exports professional services such as accounting to its neighbours. Burundi, Swaziland and Rwanda have all recorded growth of more than 25 percent a year in services exports between 1995 and 2008.

Therefore, for the Sub-Saharan Africa (SSA) to integrate successfully and benefit from the global trading system there was the need to increase her participations in world services trade. Therefore, promoting services trade in SSA will require the "ability to strengthen their capacity to produce internationally competitive services and on the extent of liberalization in the service sectors of export interest to them" (UNCTAD, 1999). How do we ensure that this onerous task does not become another herculean task for the LDCs in general and in particular, the SSA?

Although, the literature is replete with studies on international trade combining trade in goods and services, there are few studies that specifically examine the implications of services trade for growth and development in the LDCs. This paper will be filling this gap. The paper makes

contribution to knowledge by examining how the different modes of services trade can engender economic development. In achieving this, the paper adopts the extended growth model. The paper adopts a panel method of empirical analysis in order to elicit awareness on the key role of services in development and draw coherent policies that could engender greater services trade. The latter will encourage more foreign participation in services trade in the SSA.

This paper is structured as follows: In Section 2, the paper presents some stylized facts and barriers to international services trade. Section 3 reviews the literature given adequate considerations to the state of knowledge on barriers to trade in services, methods of analysis and empirical results. In Section 4, the paper highlights the theoretical background and the methodology of analysis. This includes the model specification, the method of estimation and some statistical tests as well as data sources and measurements. Section 5 presents the results and discussions. The conclusions and recommendations follow in Section 6.

2. Some Stylized Facts and Barriers to International Trade in Services

Following the widespread global financial crisis that debuted in 2007 and culminated in global depression, the global economy rebounded in 2010. Domestic demand in the developing countries accounted for 46 percent of global growth in 2010. According to the World Development Indicator (2011), the contributions of developing countries to world economic growth has been rising since 2000 and was more stable than that of the high-income economies. Estimates indicate that the world economy grew at about 3.9 percent while high-income and developing economies grew at 2.8 percent and 7 percent, respectively. Table 1 below provides more details. Growth rates in developing Africa are higher than in the developed world. Growth in countries like Nigeria, Egypt and South Africa is higher than in Japan and the USA.

Insert table 1

The importance of the service sector is increasing in many developing countries. Figure 1 shows that services value added is growing faster in developing African countries than in the other geographical groups. This fact can also be observed in terms of service value added in Table 2. In the period 2000-2009, the average annual growth rate of services sector was 2.9 percent globally while it was 2.2 percent, 6.6 percent and 4.8 percent in the high-income, lower income and SSA, respectively. (WDI, 2011). In terms of proportion of service to the GDP, table 3 shows

Insert table 2

Insert Figure 1

similar trend. The table, however, indicates that service sector is still the largest economic sector in the developed world and stood at about 46 percent in developing Africa in 2010. This underscores the fact that efficient services sector is crucial for production, employment, trade and overall economic development.

Services trade has also been on the increasing trend over the years. In 1995, global export trade in services stood at US$ 1,228.9 trillion and by 2009 it was US$ 3,418 trillion. Developing countries services export was US$ 180.8 billion and US$ 650.9 billion in 1995 and 2009, respectively. In the same period, SSA countries figures in services export stood at US$ 12.1 billion and US$ 35.6 billion. In the case of services imports, world total stood at US$ 1,221 7 trillion in 1995 as against US$ 3144.7 trillion in 2009. Of these figures, developing countries stood at US$ 228.4 billion and US$ 777.282 billion in 1995 and 2009, respectively. Similarly, SSA countries total services import in the periods stood at US$ 24.6 billion and US$ 88.5 billion. WDI (2011).

Insert table 3

There is lopsidedness in the distribution of global services trade in favour of developed countries. Tables 4 and 5 show the proportions of world trade in services by geographical distributions showing the relative positions of each region in global services trade. Table 4 which depicts services trade in export, shows that the proportion of services export of developing Africa is the lowest over the periods considered. In 1980, it was 6.6 percent and 5.2 percent in 1985. Since then, it has not gone beyond the 4.1 percent mark. In case of SSA, it was 4.5 percent in 1980 and 5.2 percent in 1985. There was a decline in this indicator between 1985 and 2000 but has since risen to stand at about 3.0 percent by 2011.

In the case of services imports, table 5, the developed world still has the lion share of about 79 percent in 1980 and 67.3 percent in 2011. The proportions due to developing African countries remain the lowest of all regions standing at 3.4 percent in 1980 and only 2.2 percent in 2011. Out of these SSA accounted for 2.2 percent in 1980 and only 1.2 percent in 2011. It follows that

services exports are relatively higher compared with figures on services import. It is evident, therefore, that while developed countries are net importers in services trade, SSA countries are net exporters in the trade.

Insert table 4

Insert table 5

The lessons from the above include the fact that SSA counties can develop their comparative advantage in services in order to benefit from the growing global services trade. However, this desired goal is not without constraint emanating from existing barriers to trade in services. Hoekman and Braga (1977) identified four types of barriers to services trade. This include the following: (1) quantity-based restrictions such as quotas or any other quantity limitations, (2) price based restrictions, (3) direct government involvement in certain service sectors and (4) restrictions imposed on importers of services' to access secondary services.

The nature of services trade makes their tradability of special interest. Some of the characteristics of services trade, according to Hoekman and Mattoo (2008), include the following: (1) intangibility in the sense that international transactions in them are often difficult to measure, monitor and tax; (2) nonstorability so that production and consumption must occur at the same place and time; (3) differentiation in the sense that services are often tailored to the needs of the consumers; and (4) joint production to the extent that the consumer participate in the production process.

To date, there are proliferations of trade agreements in the form of bilateral, multilateral, regional and cross-regional culminating in what has been described as "Spaghetti Bowl" designed to improve the trade relations between the different groups. In spite of this, there are still evidences of weak links of the existing trade arrangements. In policy formulations designed to turn services trade to engine of growth, therefore, these apparent barriers and limitations must be addressed.

3. Brief Review of the Literature

The literature has given more attention to trade in goods than services trade. However, the importance of the latter in economic growth, employment generation, welfare improvement, financial and seine environment has been brought to the fore. Since the seminar work of

Goldsmith (1969) a lot of researches have been conducted in the area of services trade. His work emphasised the role of financial services, as necessary to promote incomes and output growth via appropriate financial intermediation. Likewise, Levine 1997 has shown that financial services can enhance growth through reduction of transaction cost and improvement in the allocation of real resources.

Baumol (1967), Fuchs (1968, 1981), Inman (1985) show that increasing expansion in the service-intensity of economies has intuitively enhanced the influence of other services activities on growth. Low cost and high quality telecommunications would widely benefit the economy, as communication network facilitates information services and helps in diffusion of knowledge. They also indicated other benefits of services as follow: transport services affect the cost of shipping goods and movement across borders. Business services such as accounting, consulting engineering and legal services reduce transaction costs associated with enforcement of contracts are channels through which innovations are transmitted across industries. Retail and wholesale distribution services enhance effective producer-consumer relations hereby creating margins that influence the competitiveness of firms. Health and education services are major inputs and determinants of growth in human capital stock.

Nordas (2010) examines the interrelationship between goods and services in production and trade in the OECD countries using the input-output model of 2000. The author's objective was to describe the role of services in production and trade in goods. He proposes two versions of a general equilibrium model that captures the linkages between goods and services in order to investigate the impact of services trade liberalization on industrial structure. The model analyzes the interactions between goods and services both when they are substitutes and complements. The results indicate that trade in tasks may strengthen comparative advantage in high-tech industries in rich countries provided they have superior organization technology or are relatively capital abundant. The results may be restrictive in applications since it is based on computable general equilibrium model that depends on the SAM as well as the parameters for the calibrations.

Kikutchi and Iwasa (2010) propose a theoretical two-country monopolistic competition model of service trade that captures the role of time zone differences as a determinant of trade patterns. Their results show that the utilization of communications networks induces dramatic change in

industrial structure due to firms taking advantage of time zone differences: services firms move away from larger countries in favour of small countries. Although the analysis is tentative, it provides a useful paradigm for considering how time zone differences affect both the structure of service provision and international trade patterns.

UNCTAD (2003) examines the quantitative nexus between GDP growth and exports of services in developing countries and transition economies. The paper uses the Export-Led Growth (ELG) hypothesis to test the causal relation between export and GDP growth. The paper is based on a cross section of 114 countries. There are six groups of countries in the study as follow: developed countries (24); Latin America (21); Africa (21); Near East and Mediterranean (10); East Asia and Pacific (19); and Transition countries (19).the period of analysis is 1990-2000.

Based on extensive statistics and econometric analysis, the results of the study show that export oriented activities in developing countries are often under the control of a foreign economic agent and tend to be poorly integrated into the domestic economy. Consequently, the potential for services export to become engine of growth is substantially dampened. The paper opines that there was misallocation of resources in favour of exports as a goal in itself rather in the framework of a comprehensive long-term growth strategy. It concluded that such liberalization policy have ended up facing diminishing returns.

Hoekman and Mattoo (2008) discusses the role of services in economic growth, focusing in particular on channels through which openness to trade in services may increase productivity at the level of the economy as a whole, industries and the firm. Using descriptive approach and few statistics to drive home its arguments, the paper contends that the competitiveness of firms in open economies is increasingly determined by access to low-cost and high quality producer services in telecommunications, transport and distribution services, financial intermediation, etc. The paper concludes that enhancing comparative advantage in the production and export of services will ensure greater efficiency and greater equity in the less developed economies.

Authors have also used other empirical methods to investigate the role of services on economic growth. Walsh (2006) employs the gravity model approach to examine the determinants and barriers to services trade. The data used in the paper is sourced from the OECD database in which the breakdown of total exports and total imports were decomposed into travel, transport, government and other commercial. The panel data is constituted by twenty-seven OECD

countries, fifty-five non-OECD partner countries over of three years: 1999-2001. A number of econometric estimators are tested. The paper, however, found the Hausman-Taylor method to be the best estimator.

The paper found out, amongst others, the following: that (1) gravity model fits services trade flows in the same way as trade in goods; (2) wealth of countries and a common language are the most important determinants of services trade; (3) distance is generally found to be insignificant; and (4) the variable designed to capture barrier to services trade is found to be weakly significant.

Kimura and Lee (2004) using the gravity equation assess the impact of various factors on bilateral services trade relative to bilateral goods trade. They run regressions on bilateral services trade and goods trade on ten OECD members and other OECD and non-OECD countries for the period 1999-2000. The paper show that the gravity model could even be more robust for services trade than it is for goods trade. Specifically, the results indicate that geographical distance is consistently more important for services trade than for goods trade. It also finds out that membership of the same regional trade arrangement has a significant impact on both services trade and goods trade. In addition, the paper suggests that both goods trade and services trade are positively affected by economic freedom but the effect is much stonger for services trade than for goods trade.

4. Theoretical Framework and Methodology

4.1 Theoretical Framework

A number of authors have examined the determinants of economic growth most of them drawing from the standard neoclassical growth model *a la* Solow (1956) in what is also termed exogenous growth model. (Aghion and Howitt (2009), Barro and Sala-i-Martin (2004)). According to a variant of this school of thought, trade does not affect the equilibrium or steady state rate of output growth since growth is determined by exogenous factor identified as technological progress. The Export-Led Growth (ELG) hypothesis, much as the neoclassical growth model, has provided a theoretical standpoint for analysis of trade, in general. On the bases of the hypothesis, some authors associate the positive impact of exports on growth to production efficiency gains resulting from improved allocation of resources (Beckerman, 1965).

Some others emphasize the dynamic effects of such factors as availability of foreign capital and technology (Haberlar, 1959).

More recently, attention has been concentrated on what is now known as augmented Solow model or the endogenous growth model. In this case, the growth of an economy is determined not only by labour and capital but by other variables including investment, education, health and population growth Mankiw, Romer and Weil (1992). Under this variant, trade variables or trade liberalization can have positive or negative impact on output growth. Hoekman and Mattoo (2008) asserts that if trade liberalization shifts resources into manufacturing and away from agriculture, there will be a positive impact on the long-run growth provided the manufacturing sector generates greater positive externalities or creates knowledge. This idea can be extended to services sector. In this respect, certain services sector can engender endogenous growth. Such sectors include telecommunication, software, financial services and transport. Although, the growth-enhancing potential of exports in contrast to other variables has been subject of controversy in the literature, services trade can be seen as an instrument of overall economic growth and development.

In the context of African economy, several studies have tried to explain the recent growth experience in the continent particularly in the last two decades (Guerguil et al, 2011; Johnson, Ostry and Subramamian 2007; and Patillo, Gupta and Carey, 2006). Though few studies have examined the growth-enhancing potential of services trade in the SSA countries, the experiences of the East Asian Tigers and the Latin America could be reproduced in the sub-region. This paper recognizes that are other theories of economic growth including the classical, the energy and energy efficiency, theory of cognitive wealth, the big push, the Schumpeterian and the endogenous. This paper, however, employs the endogenous growth model to investigate services trade as engine of growth and development.

4.2 Methodology

4.2.1 Model Specification

The empirical framework of this paper draws from the endogenous growth adduced to in the last paragraph. In that context, the paper postulates that aggregate growth is determined by changes in quantity and productivity of capital and labour inputs as well as technological progress as the

control variables. The primary variable of interest here is the service sector and particular, the services trade. Although, this sector is heterogenous in nature, its role as inputs in production activities cannot be hidden. One dimension of services is that it facilitates transactions through space and time. Another important dimension is that it is a direct input into economic activities and thus a determinant of "fundamental" factors of production. Immediate examples are services such as R&D, health and education which are inputs into production of human capital.

In this paper, therefore, services trade variables of primary interest follow the World Trade Organization (WTO) Classification namely transport services (TS) and travel services (VS). The third variable is an aggregation of financial services, communication, construction, computer and information as well as those classified as "others". This variable is denoted aggregated services (AS). This is to ensure that all variables across the different countries in the paper have the same dimension. In this paper, the GDP per capita (YPC) instead of growth rate of real GDP is used as the dependent variable. This study employs YPC since our intention is to capture economic development and not economic growth (See Lucas (1988) for a justification). In line with these postulations, the model can be specified as follows:

$$YPC = f(K, L, TS, VS, AS; Z) \quad (1)$$

where YPC, TS, VS, and AS are as defined above. K is the stock of capital proxied by gross fixed capital formation, L is labour force and Z is a vector of other variables not explicitly considered including the stochastic error term in the model. As the standard is in growth model, the paper assumes a nonlinear relationship between YPC and the set of explanatory variables. Consequently, equation (1) is nonlinear in its explicit form and therefore it is transformed into its linear form using double logarithm in other to satisfy the assumptions of Ordinary Least Squares (OLS) technique of estimation. Thus, equation (1) becomes the following:

$$YPC = \beta_0 + \beta_1 \log(K) + \beta_2 \log(L) + \beta_3 \log(TS) + \beta_4 \log(VS) + \beta_5 \log(AS) + \varepsilon \quad (2)$$

The apriori signs and magnitudes of equation (2) need not be specified since the parameters, β_i, i=1,…,5 are elasticities with the conventional values of < 1 for inelastic; = 1 for unit elasticity and > 1for elastic.

In what follows, we introduce the panel framework into the model by introducing the country index and incorporating countries' unobservable individual effects in equations (2), the equations to be estimated can be rewritten as follow:

$$\log(YPC_{it}) = \theta_0 + \theta_1 \log(K_{it}) + \theta_2 \log(L_{it}) + \theta_3 \log(ETS_{it}) + \theta_4 \log(EVS_{it}) + \theta_5 \log(EAS_{it}) + \mu_{Xi} + \omega_{Xt} + \epsilon_{Xit} \quad (3)$$

$$\text{Log}(YPC_{it}) = \theta_0 + \theta_1 \log(K_{it}) + \theta_2 \log(L_{it}) + \theta_3 \log(ITS_{it}) + \theta_4 \log(IVS_{it}) + \theta_5 \log(IAS_{it}) + \mu_{Xi} + \omega_{Xt} + \epsilon_{Xit} \quad (4)$$

where *i* denotes country *i*, *t* denotes time and μ_{Xi} (μ_{Mi}) is country *i* unobservable individual effects on export (import) equation. ω_{Xt} and ω_{Mt} are unobservable time effect for export and import respectively. ϵ_{Xit} and $\varepsilon_{Mit,}$are stochastic disturbance terms such that $\varepsilon_{Xit} \approx i.i.d(0, \sigma_X^2)$ and $\varepsilon_{Mit} \approx iid(0, \sigma_M^2)$for export and import equations respectively. The specifications in equations (3) and (4) in which individual effects are incorporated are particularly justified in developing economies of SSA. In effect, those equations allow us to account for individual heterogeneity that if not taken into consideration can lead to biased estimates (Tiwari and Mutascu, 2010).

4.2.2 Technique of Estimation

The main objective of this paper is to examine the relationship between YPC and services trade variables. Since the scope of the paper is SSA countries, it employs the panel data in view of its advantages (See Alege and Osabouhien (forthcoming)). We commence with the pooled Ordinary Least Square regression, then proceed to Panel Least Square Dummy Variable (PLSDV) regressions, fixed effects and random effects methods of estimation. This is to enable us choose the most efficient and consistent technique given the possibility of the presence of correlation between countries' unobservable individual effects and the services trade predictors.

To begin with, these methods are briefly described in the following paragraphs:

a. Least Square Dummy Variable Approach

The Least square dummy variable (LSDV) approach simply include the countries binary dummy into the pooled OLS in order to ascertain the effect of the country specific intercept in our estimation. In this case, equation 3 can be rewritten as follows:

Export Model:

$$LYPC_{it} = \beta_0 + \sum_{i=1}^{33} \beta_i X_{it} + \sum_{i=1}^{33} \varphi_i \epsilon_i + U_{it} \quad (5)$$

$$where\ X_{it} \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Levs_{it} \\ Lets_{it} \\ Leas_{it} \end{Bmatrix}, \epsilon_i\ is\ the\ country\ i; since\ they\ are\ binary\ (dummies), i - 1$$

$$countries\ are\ included\ in\ the\ model, \varphi_i\ is\ the\ coefficient\ for\ the\ binary\ repressor\ (countries)$$

Import Model:

$$LYPC_{it} = \beta_0 + \sum_{i=1}^{33} \beta_i X_{it} + \sum_{i=1}^{33} \varphi_i \epsilon_i + U_{it} \quad (6)$$

$$where\ X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Livs_{it} \\ Lits_{it} \\ Lias_{it} \end{Bmatrix}, \epsilon_i\ is\ the\ country\ i; since\ they\ are\ binary\ (dummies), i - 1$$

$$countries\ are\ included\ in\ the\ model, \varphi_i\ is\ the\ coefficient\ for\ the\ binary\ regressor\ (countries)$$

b. Fixed Effects Approach

The choice of the fixed effect model is considered due to its appropriateness in analyzing the impact of variables overtime. It explores the relationship between services variables and GDP per capita among SSA countries assuming that each country has a unique attributes which are likely to influence the outcome of the model. The fixed effect model is more appropriate than the pooled regression because it controls for the influence of cross-sectional bias on the outcome variables, i.e. it removes the effect of time invariant characteristics from the predictor variables. In this case, the export and import model can be written as follow:

Export Model:

$$LYPC_{it} = \beta_0 + \sum_{j=1}^{5} \beta_j X_{it} + \sum_{i=1}^{33} \alpha_i + U_{it} \quad (7)$$

$$where\ X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Levs_{it} \\ Lets_{it} \\ Leas_{it} \end{Bmatrix}, \alpha_i (i = 1 \dots 33) is\ the\ unknown\ intercept\ for\ each\ country$$

Import Model:

$$LYPC_{it} = \beta_0 + \sum_{j=1}^{5} \beta_j X_{it} + \sum_{i=1}^{33} \alpha_i + U_{it} \quad (8)$$

$$where\ X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Livs_{it} \\ Lits_{it} \\ Lias_{it} \end{Bmatrix}, \alpha_i (i = 1 \dots 33) is\ the\ unknown\ intercept\ for\ each\ country$$

The fixed effect model is relevant as it enables us to sieve-out the unobserved effect (using fixed) across entities; hereby making changes in dependent variables absolutely explained by influences from the observed services predictor.

c. Random Effect Approach

Unlike the fixed effect model, the random effect model assumes that variations across countries are random and uncorrelated with the independent variables.

Export Model:

$$LYPC_{it} = \beta_0 + \sum_{j=1}^{5} \beta_j X_{it} + \alpha + U_{it} + \varepsilon_{it} \quad (9)$$

$$where\ X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Levs_{it} \\ Lets_{it} \\ Leas_{it} \end{Bmatrix}$$

Import Model:

$$LYPC_{it} = \beta_0 + \sum_{j=1}^{5} \beta_j X_{it} + \alpha_i + U_{it} + \varepsilon_{it} \quad (10)$$

$$where\ X_{it} = \begin{Bmatrix} Lk_{it} \\ Ll_{it} \\ Livs_{it} \\ Lits_{it} \\ Lias_{it} \end{Bmatrix}$$

In the presence of correlation between individual country unobservable individual effects and services trade predictors, the appropriate method is the fixed effect. If however, there is no correlation between individual country effects and trade determinants, then random effects method on the panel data will be the most appropriate. The choice of which one to use depends on the outcome of Hausman Test. This statistic tests the null hypothesis of non-existence of correlation between unobservable individual effects and services determinants against the alternative hypothesis of existence of correlation. If the null hypothesis is not rejected we can conclude as in Tiwani and Mutascu (2010), that correlation is not relevant and therefore a panel

model of random effects being the most correct way of carrying out the analysis. On the contrary, if the null hypothesis is rejected we can conclude that correlation is relevant and therefore a panel model of fixed effects being the most appropriate way of carrying out our analysis of the effect of services trade on GDP per capita of SSA countries.

4.2.3 Data Sources and Measurements

The sources and measurement of the variables used in this model is presented in Table 6. All variables, in levels, are in US$ million at 2000 prices. The scope of this research is limited by the availability of data on the variables considered. In effect, the paper is limited to aggregate time series data on YPC and the services trade variables. Bilateral trade figures are not available. Hence, our analysis could not use, for now, the Gravity model to capture extent of trade in services between SSA countries. We carry out panel data analysis on thirty-three (33) countries[1] within the SSA sub-region. Data are collected on both exports and imports along the reclassification presented earlier in this paper. The real GDP and population per country were obtained from World Development Indicators (2012) while services trade variables (both exports and imports) were sourced from UNCTAD (2012). The paper covers the period of 1990-2010.

Insert table 6

5. Estimation and Discussion

5.1 Introduction

In this section, we present the summary descriptive statistics of all the variables in the model, the correlation coefficient matrix, the least square dummy variable regression, fixed and random effects regression results. The paper then finally discusses the results.

5.2 Preliminary Data analysis

Table 7 reports the summary statistics for both the dependent and the independent variables in the export and import models. It reports the overall mean, standard deviation, and the minimum and maximum values for all the variables in the model for all the countries combined. The mean

[1] include: Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Congo, Cote d'Ivoire, Gabon, Gambia, Ghana, Guinea, Kenya, Lesoth[1]o, Madagascar, Malawi, Mali, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Seychelles, Sierra Leone, South Africa, Swaziland, Togo, Uganda, Tanzania, Zambia, Zimbabwe

of the GDP per capital, is calculated at US$1,076.64 for all countries combined. This figure contrasts very sharply with what is the actual income per capital in the different countries of the SSA. In effect, the region is made up of some very rich countries (Botswana, Nigeria, South Africa) and low income countries (Mali, Guinea Bissau, Ethiopia). The mean of all other variables can be interpreted in the same manner. In the cases of services variables, it could be seen that these values will certainly be lower than other region of the world.

Insert table 7

In this paper, it is recognised that the issue of strong correlation between the independent variables may violate the working assumptions of the estimation technique. We, therefore, examine the possibility of the presence of multi-collinearity among the independent variables in the model by examining the pair-wise correlation matrix as contained in Table 8. The table indicates that there exists a significant positive correlation between EAS and K; EAS and EVS as indicated in the upper panel and between ETS and EVS. In case of the import model, there is a significant positive correlation between K and IVS; K and ITS, K and IAS, ITS and IVS; IAS and IVS as well as IAS and ITS. Overall, it can be established that the magnitude of the correlation coefficients indicate that multi-collinearity is not a potential problem in the models. Thus, the data set in conjunction with the variables are appropriate for the study.

Insert table 7

5.3 Discussion of Results

Table 9 and 10 contain results of import and export model estimations using the four techniques of panel data estimation. In each case model 1 stands for POLS, model 2 stands for LSDV, model 3stands for FE and model 4 stands for RE. In case of the import model the POLS regression result show a very high R-squared and the F-test show that the variables in the model are jointly significant. In addition, all the variables are statistically significant at one percent; similar result is obtained for LSDV technique except that the coefficient of travel services is not statistically significant. From theoretical under spinning, the POLS would likely produce a large magnitude due to the inclusion of the country time invariant effects. Model 3 (FE) is preferred to LSDV because the number of variables included in the latter produces an R-squared than is higher than that of the former; otherwise, the two have the same results.

In order to choice between FE and RE the Hausman test was adopted. Here, we fit both the fixed effect model and random effect model, and compare their common coefficient estimates in a probabilistic sense (See C.F Baum 2006). The null hypothesis of Hausman test states that random effect estimator is consistent. Since the Hausman test was found to be significant, we therefore failed to accept the null hypothesis and conclude that the country specific effects appear to be correlated with the regressors. The fixed effect model is, thus, appropriate in explaining the relationship between the services variable in the import sector and GDP per capita in the selected Sub-Saharan Africa. It then follows that import travel services, transport services and other services have significant impact on economic development.

Table 10 can be interpreted in the same manner for services export. Therefore, in the same manner, the FE technique is preferred to the RE technique based on the Hausman test. It then follows that the use of the FE result is considered. In the result, only export of travel services was found not to be significant while others were found statistically significant at least at 5 percent significance level. It then follows that export of travel services and other services contribute very significantly to the economic development of SSA countries. The case of transport services that happens to be statistically insignificant and therefore not contributing to economic development of SSA is not surprising. In effect, SSA countries seemingly have comparative disadvantage in transport services.

5.4 Robustness Test

This paper examines some few robustness tests for both import and export model, these combination of tests are necessary to check the reliability of our model for the purpose of policy inferences (see table 11). In case of the import model, the time fixed effects test, Breusch and Pagan Lagrangian Multiplier (LM) test, Modified Wald test for groupwise heteroskedasticity and the Wooldridge test for autocorrelation were conducted. The significance of the time fixed effects test indicates that the coefficients of the time dummies are not significantly different from zero; therefore, there is no need to apply time fixed effects. The LM test, heteroskedasticity test and Wooldridge autocorrelation test show an evidence of significant differences across unit (panel effect), presence of heteroskedasticity and no serial correlation, respectively.

The test for the export model can be interpreted in this same manner. The significance of the time fixed effect and the LM test indicate no need for the including time fixed effect and evidence of panel effect, hereby emphasizing the preferability of the random regression to the Ordinary Least Square. Likewise, the Modified Wald and Wooldridge test results show presence of heteroskedasticity and no serial correlation in panel data respectively.

6. Conclusion

The role of trade in economic growth and development remains at the front burner of research. Most of this literature has concentrated on trade in goods. However, since the WTO in 1995, there has been growing interest in services trade. In this paper we attempt to assess the relationship between economic development and services trade variables. An empirical analysis is carried out based on the endogenous growth theory in a panel of 33 SSA countries employing data set from 1990 to 2010. We employ GDP per capita to proxy economic development. The paper uses the static panel data models to capture both the intertemporal dynamics and the individual characteristics of the phenomenon under investigation. In this paper, we employ the three basic types of panel data models namely, a Least Square Dummy Variable (LSDV) regression, panel model with random effects and panel model with fixed effects.

From various statistical sources, the paper establishes that service sector is increasing in importance in the developing world contributing to production, output and employment. Global trade has been on the increase and has benefited the developing countries although the distribution of services trade is lopsided in favour of developed economy. Statistics also indicates that services export and import of SSA are the lowest in the world. However, while the developed countries are net importers of services, SSA countries are net exporters in services trade.

Based on the fixed effect regressions, the paper finds that services trade in export and import enhance economic development of SSA countries. In particular, from the export model, it finds out that travels and other services contributed significantly to economic development of SSA. Similarly, from the import model, it finds out that transport and other services contribute also significantly to economic development of the region. However, further studies should be

conducted using gravity model to capture bilateral services trade. Testing the existence of cointegration using fractional differencing should also be envisage.

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Appendix

Table 1: GDP Growth Rates (%)

	1980	1985	1990	1995	2000	2005	2010	2011
Developed world	**0.3**	**3.7**	**2.7**	**2.6**	**3.9**	**2.4**	**2.7**	**1.4**
USA	-0.3	4.1	1.9	2.5	4.2	3.1	3.0	1.7
Japan	-3.1	6.3	5.6	1.9	2.8	1.9	4.0	-0.7
China	7.8	13.5	3.8	10.9	8.4	11.3	10.4	9.2
Developing Asia	**3.6**	**4.2**	**6.5**	**7.5**	**6.8**	**7.9**	**8.4**	**6.9**
Eastern Asia	5.0	8.9	5.8	9.0	8.1	8.6	9.5	7.7
Southern Asia	1.0	4.6	6.5	6.4	4.0	8.2	7.1	5.6
Western Asia	2.9	-0.1	6.5	4.5	6.4	6.9	6.4	7.4
Developing America	**6.3**	**3.3**	**0.5**	**0.7**	**4.4**	**4.6**	**6.0**	**4.3**
Caribbean	1.5	0.1	-1.3	3.4	4.5	7.6	2.9	2.6
Central America	7.7	2.6	4.9	-5.2	6.3	3.4	5.6	4.0
South America	6.0	4.0	-1.7	3.9	3.3	5.0	6.4	4.5
Developing Africa	**3.9**	**3.2**	**2.6**	**2.6**	**3.5**	**5.4**	**4.0**	**0.7**
SSA	3.9	2.0	2.2	3.5	3.6	5.6	4.0	4.1
Northern Africa	2.8	5.7	3.7	1.4	3.7	5.2	4.1	-5.8
Southern Africa	6.6	-1.0		3.3	4.2	5.0	3.0	3.2
Western Africa	1.2	7.0	6.9	2.0	3.3	4.0	3.7	6.2
Nigeria	4.2	8.3	12.8	-0.3	5.3	3.4	2.8	7.4
Egypt	10	6.8	5.8	4.6	5.4	4.5	5.1	1.8
South Africa	6.6	-1.2	-0.3	3.1	4.2	5.3	2.8	3.1

Source: Computed from UNCTAD Handbook of Statistics

Table 2: Service Value-Added (US$ billion)

	1980	1985	1990	1995	2000	2005	2010
Developed world	**4.765**	**5.816**	**10.937**	**15.44**	**17.185**	**23.667**	**28.808**
USA	1.783	2.83	4.063	5.345	7.573	9.77	11.48
Japan	0.634	0.828	1.84	3.526	3.26	3.29	3.988
China	0.65	0.92	0.129	0.238	0.468	0.914	2.557
Developing Asia	**0.485**	**0.611**	**0.996**	**1.636**	**2.069**	**3.377**	**6.634**
Eastern Asia	0.133	0.193	0.404	0.791	1.101	1.767	3.587
Southern Asia	0.143	0.157	0.215	0.266	0.338	0.612	1.238
Western Asia	0.132	0.155	0.211	0.257	0.346	0.574	0.968
Developing America	**0.395**	**0.385**	**0.573**	**1.085**	**1.24**	**1.512**	**2.804**
Caribbean	0.24	0.28	0.38	0.48	0.57	0.82	0.114
Central America	0.141	0.134	0.189	0.239	0.419	0.572	0.722
South America	0.23	0.223	0.346	0.803	0.765	0.859	1.968
Developing Africa	**0.158**	**0.161**	**0.22**	**0.257**	**0.28**	**0.436**	**0.742**
SSA	0.111	0.103	0.141	0.161	0.161	0.295	0.494
Northern Africa	0.5	0.61	0.85	0.102	0.124	0.155	0.277
Southern Africa	0.36	0.28	0.59	0.89	0.84	0.156	0.235
Western Africa	0.38	0.37	0.3	0.26	0.28	0.57	0.104
Nigeria	0.24	0.24	0.77	0.64	0.98	0.26	0.53
Egypt	0.8	0.11	0.17	0.31	0.51	0.46	0.99
South Africa	0.34	0.27	0.56	0.85	0.78	0.146	0.219

Source: Computed from UNCTAD Handbook of Statistics

Table 3: Ratio of Service Value-Added to GDP (%)

	1980	1985	1990	1995	2000	2005	2010
Developed world	**60.1**	**63.4**	**65.4**	**68.5**	**71.6**	**73.2**	**74.4**
USA	64.6	67.7	70.6	72.6	76.0	77.1	78.1
Japan	57.2	58.9	59.1	64.9	67.2	69.4	71.3
China	21.6	29.5	32.4	32.7	39.0	40.5	43.1
Developing Asia	**36.1**	**43.7**	**45.9**	**48.3**	**49.8**	**49.1**	**48.6**
Eastern Asia	30.4	37.9	45.3	48.7	50.7	49.5	47.8
Southern Asia	44.7	45.6	45.5	46.6	50.2	51.6	53.1
Western Asia	34.3	49.8	46.8	48.8	48.7	47.3	49.7
Developing America	**51.4**	**50.7**	**55.0**	**63.3**	**62.6**	**60.9**	**61.7**
Caribbean	58.6	63.1	64.4	65.8	65.2	67.4	67.9
Central America	53.1	50.2	56.7	61.6	60.7	62.6	62.7
South America	49.7	49.7	53.3	63.6	63.6	59.3	61.1
Developing Africa	**38.7**	**42.8**	**47.1**	**50.8**	**49.2**	**45.7**	**45.6**
SSA	39.1	42.2	46.6	50.6	49.2	47.2	46.8
Northern Africa	38.2	44.3	47.9	51.4	49.2	42.9	42.9
Southern Africa	45.1	50.8	54.4	60.6	63.8	65.0	65.6
Western Africa	32.5	35.5	37.7	36.6	33.5	32.4	34.5
Nigeria	27.9	30.9	23.2	21.9	21.8	23.7	27.5
Egypt	42.7	49.9	50.9	50.9	54.1	49.8	48.5
South Africa	45.4	51.2	55.3	61.3	64.9	66.2	66.7

Source: Computed from UNCTAD Handbook of Statistics

Table 4: Share of Services Export in World Services Export (%)

	1980	1985	1990	1995	2000	2005	2010	2011
DEVELOPED WORLD	**66.1**	**68.5**	**74.4**	**70.7**	**70.7**	**68.8**	**61.4**	**60.1**
U.S.A	9.2	16.2	13.4	11.4	14.5	12.3	11.0	10.5
Japan	7.2	7.0	9.6	9.1	7.0	5.0	4.3	4.1
China		0.6	0.5	2.3	2.4	3.4	5.6	5.8
DEVELOPING ASIA	**17.8**	**18.6**	**14.2**	**19.3**	**19.7**	**21.2**	**26.4**	**27.2**
Eastern Asia	2.9	3.9	4.9	8.0	8.0	8.6	10.5	11.0
Southern Asia	2.3	2.2	1.6	1.5	1.9	2.9	4.2	4.1
Western Asia	9.6	9.0	4.5	3.7	4.0	4.1	5.6	5.6
DEVELOPING AMERICA	**6.7**	**5.3**	**4.3**	**4.6**	**4.9**	**3.9**	**4.6**	**4.8**
Caribbean	0.6	0.7	0.6	0.5	0.5	0.4	0.3	0.3
Central America	1.9	1.6	1.4	1.1	1.5	1.1	1.0	1.0
South America	4.2	2.9	2.3	3.0	2.9	2.3	3.3	3.5
DEVELOPING AFRICA	**6.6**	**5.2**	**3.5**	**3.1**	**2.7**	**3.1**	**4.1**	**4.1**
SSA	4.5	3.1	2.5	2.2	1.8	2.2	3.0	3.0
Northern Africa	2.2	2.1	1.0	0.9	1.0	1.0	1.2	1.1
Southern Africa	0.9	0.6	0.5	0.6	0.5	0.6	0.6	0.6
Western Africa	2.0	1.0	0.7	0.7	0.5	0.6	0.9	1.0
Nigeria	1.2	0.4	0.2	0.4	0.2	0.3	0.6	0.6
Egypt	0.5	0.7	0.4	0.4	0.5	0.4	0.4	0.3
South Africa	0.7	0.5	0.4	0.5	0.4	0.5	0.5	0.4

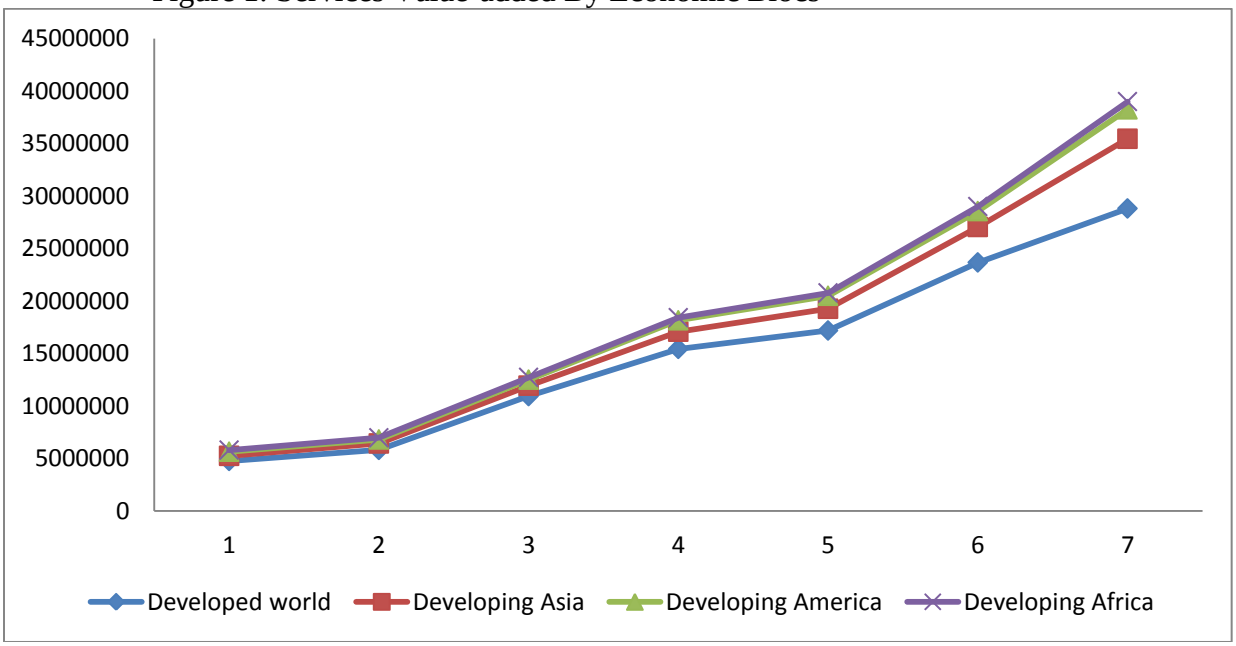
Source: Computed from UNCTAD Handbook of statistics

Table 5: Share of Services Import in World Services Import (%)

	1980	1985	1990	1995	2000	2005	2010	2011
DEVELOPED WORLD	**79.0**	**78.4**	**79.9**	**76.1**	**75.3**	**73.2**	**67.6**	**67.3**
U.S.A	12.0	17.8	17.8	17.9	19.0	14.7	14.4	14.1
Japan	5.1	5.3	5.0	5.4	4.6	4.1	3.6	3.4
China		0.7	0.7	1.6	2.0	2.9	4.5	4.3
DEVELOPING ASIA	**10.3**	**11.8**	**11.6**	**16.2**	**16.8**	**18.7**	**23.7**	**24.1**
Eastern Asia	3.8	4.7	5.2	7.7	8.3	8.7	11.3	11.4
Southern Asia	1.3	1.3	0.9	1.0	1.5	2.5	3.8	3.7
Western Asia	2.7	2.8	2.0	2.3	2.5	2.8	2.9	2.9
DEVELOPING AMERICA	**4.8**	**4.7**	**3.8**	**3.7**	**4.0**	**3.4**	**3.5**	**3.5**
Caribbean	1.0	1.2	0.9	0.9	1.0	0.9	0.8	0.7
Central America	1.6	1.6	1.3	1.1	1.3	1.0	0.8	0.8
South America	2.3	1.9	1.6	1.7	1.7	1.6	1.9	2.0
DEVELOPING AFRICA	**3.4**	**3.0**	**2.6**	**2.3**	**2.2**	**2.3**	**2.3**	**2.2**
SSA	2.2	1.6	1.4	1.2	1.1	1.2	1.2	1.2
Northern Africa	1.3	1.4	1.3	1.2	1.1	1.2	1.2	1.0
Southern Africa	0.7	0.5	0.5	0.4	0.4	0.5	0.4	0.4
Western Africa	0.7	0.4	0.4	0.2	0.3	0.2	0.2	0.2
Nigeria	0.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Egypt	0.6	0.7	0.7	0.7	0.6	0.6	0.6	0.5
South Africa	0.6	0.4	0.4	0.4	0.3	0.4	0.3	0.4

Source: Computed from UNCTAD Handbook of Statistics

Figure 1: Services Value-added By Economic Blocs



Source: Computed from UNCTAD Handbook of Statistics

Table6: Data Sources and measurement

Variable	Description	Source	Measurement
YPC	GDP Per Capita Income	World Development Indicators of World Bank	Constant US$ 2000
K	Capital Stock	World Development Indicators of World Bank	Constant US$ 2000
L	Labourforce	World Development Indicators (WDI) of World Bank	Number
EVS	Export of travel services	UNCTAD Handbook of Statistics, 2012	US$ Million
ETS	Export of transport services	UNCTAD Handbook of Statistics, 2012	US$ Million
EAS	Export of other services	UNCTAD Handbook of Statistics, 2012	US$ Million
IVS	Import of travel services	UNCTAD Handbook of Statistics, 2012	US$ Million
ITA	Import of transport services	UNCTAD Handbook of Statistics, 2012	US$ Million
IAS	Import of other services	UNCTAD Handbook of Statistics, 2012	US$ Million

Source: Computed by authors

Table 7: Summary Statistics of Variables: Export Model

Variable	***YPC***	***K***	***L***	***EVS***	***ETS***	***EAS***
Mean	*1076.64*	*1.77e+09*	*5914401*	*305.8883*	*159.9459*	*225.1596*
Std. Dev.	*1555.953*	*4.73e+09*	*7458988*	*913.1793*	*307.6753*	*414.7742*
Min	*126.1884*	*2.33e+07*	*250597.8*	*0.82*	*0.378239*	*0*
Max	*8739.787*	*4.38e+10*	*5.03e+07*	*9085.04*	*1969.8*	*3303.27*
Period (T)	*21*	*21*	*21*	*21*	*21*	*21*
No. of Observations (N)	*693*	*633*	*672*	*657*	*657*	*663*
Summary Statistics of Variable: Import Model						
				IVS	***ITS***	***IAS***
Mean	*1076.64*	*1.77e+09*	*5914401*	*255.8565*	*418.1585*	*549.6665*
Std. Dev.	*1555.952*	*4.73e+09*	*7458988*	*735.7926*	*920.1414*	*1475.845*
Min	*126.1884*	*2.33e+07*	*250597.8*	*1.888*	*8.286*	*1.606*
Max	*8739.787*	*4.38e+10*	*5.03e+07*	*9777.41*	*8492.66*	*18164.31*
Period (T)	*21*	*21*	*21*	*21*	*21*	*21*
No. of Observations (N)	*693*	*633*	*672*	*655*	*672*	*664*

Source: Computed by authors

Table 8: Correlation Matrix: Export Model

Variable	***Lk***	***Ll***	***Levs***	***Lets***	***Leas***
Lk	*1.0000*				
Ll	*0.4562*	*1.0000*			
Levs	*0.5668*	*0.1913*	*1.0000*		
Lets	*0.5543*	*0.2178*	*0.6926*	*1.0000*	
Leas	*0.6546*	*0.3338*	*0.5824*	*0.7702*	*1.0000*
Correlation Matrix: Import Model					
			Livs	***Lits***	***Lias***
Lk	*1.0000*				
Ll	*0.4562*	*1.0000*			
Livs	*0.7856*	*0.4344*	*1.0000*		
Lits	*0.8485*	*0.5435*	*0.7309*	*1.0000*	
Lias	*0.7857*	*0.3835*	*0.7230*	*0.8017*	*1.0000*

Source: Computed by authors

Table 9: Import Model Estimations

	Model 1	Model 2	Model 3	Model 4
	POLS	**LSDVM**	**FE**	**RE**
Lk	0.333***	0.106***	0.106***	0.142***
	(12.61)	(8.96)	(8.96)	(10.44)
Lk	-0.796***	0.0975**	0.0975**	- 0.124***
	(-50.02)	(3.03)	(3.03)	(-3.77)
Livs	0.161***	0.0137	0.0137	0.0206*
	(8.86)	(1.77)	(1.77)	(2.26)
Lits	0.183***	0.0696***	0.0696***	0.0779***
	(6.83)	(6.29)	(6.29)	(5.97)
Lias	0.0786***	0.0387***	0.0387***	0.0474***
	(4.03)	(3.83)	(3.83)	(3.99)
_cons	9.314***	2.071***	2.071***	4.459***
	(22.05)	(5.00)	(5.00)	(10.20)
N	571	571	571	571
r^2	0.873	0.990	0.528	
ar^2	0.872	0.990	0.498	
Wald Chi^2				480.55***
F-test	779.33***	119.92***	119.92***	
H-test				1499.06***
FE-test			$F_{(30, 535)}$= 214.02	
Countries Included	33	33	33	33

Notes: 1.the Hausman test (H-test) has χ^2 distribution and tests the null hypothesis that unobservable individual effects are not correlated with the explanatory variables, against the alternative hypothesis of correlation unobservable individual effects and the explanatory variables.

2. The Wald test has χ^2 distribution and tests the null hypothesis of insignificance as a whole of the parameters of the explanatory variables, against the alternative hypothesis of significance as a whole of the parameters of the explanatory variables.

3. The F test has normal distribution N(0, 1) and tests the null hypothesis of insignificance as a whole of the estimated parameters, against the alternative hypothesis of significance as a whole of the estimated parameters.

4. ***, ** and * denote significance at 1, 5 and 10% level of significance respectively

5. POLS, LSDVM, FE and RE denotes pooled ordinary Least Square, Least Square Dummy Variable Model, Fixed Effect and Random Effect respectively

Source: Computed by authors

Table 10: Export Model Estimations

	Model 1	Model 2	Model 3	Model 4
	POLS	**LSDVM**	**FE**	**RE**
Lk	0.559***	0.152***	0.152***	0.178***
	(28.76)	(11.62)	(11.62)	(12.19)
Lk	-0.770***	0.0993**	0.0993**	-0.0993**
	(-45.11)	(2.73)	(2.73)	(-2.77)
Livs	0.0257	0.0231**	0.0231**	0.0335***
	(1.91)	(3.08)	(3.08)	(4.02)
Lits	0.0515**	-0.0073	-0.0073	0.0020
	(2.93)	(-0.89)	(-0.89)	(0.22)
Lias	0.0489*	0.0249**	0.0387**	0.0329***
	(2.38)	(3.00)	(3.00)	(3.52)
_cons	5.834***	1.499**	1.499**	3.814***
	(17.70)	(3.02)	(3.02)	(7.57)
N	549	549	549	549
r^2	0.848	0.989	0.497	
ar^2	0.846	0.989	0.462	
wald Chi^2				430.75***
F-test	604.35***	101.29***	101.29***	
H-test				880.89***
FE-test			$F_{(30, 531)}$= 230.93	
Countries Included	33	33	33	33

Notes: 1.the Hausman test (H-test) has χ^2 distribution and tests the null hypothesis that unobservable individual effects are not correlated with the explanatory variables, against the alternative hypothesis of correlation unobservable individual effects and the explanatory variables.

2. The wald test has χ^2 distribution and tests the null hypothesis of insignificance as a whole of the parameters of the explanatory variables, against the alternative hypothesis of significance as a whole of the parameters of the explanatory variables.

3. The F test has normal distribution N(0, 1) and tests the null hypothesis of insignificance as a whole of the estimated parameters, against the alternative hypothesis of significance as a whole of the estimated parameters.

4. ***, ** and * denote significance at 1, 5 and 10% level of significance respectively

5. POLS, LSDVM, FE and RE denotes pooled ordinary Least Square, Least Square Dummy Variable Model, Fixed Effect and Random Effect respectively

Source: Computed by authors

Table 11: Robustness Tests Import Model

Tests	Statistics	Remark
Time fixed effects test	f(20, 515)=2.36 Prob > f =0.0008	The coefficient of the time dummies are not significantly different from Zero; therefore, no need to include Time fixed effects
Breusch and Pagan Lagrangian Multiplier test	Chi2(1)=2059.57 Prob >chi2 =0.0000	There is evidences of significant Differences across units (panel effect) Random regression preferred to OLS
Modified wald test for groupwise heteroskedasticity	Chi2 (31)= 2649.68 Prob > Chi2 = 0.3162	Presence of heteroskedasticity
Wooldridge test for Autocorrelation in panel data	f(1, 30)=59.895 Prof> f =0.20000	No serial Correlation
Robustness Test: Export Model		
Time fixed effects test	f(20, 493)=3.78 Prof > f =0.0000	The coefficient of the time dummies are not significantly different from Zero; therefore, no need to include time fixed effects
Breusch and Pagan Lagrangian Multiplier test	Chi2(1)=2593.69 Prob >chi2 =0.0000	There is evidences of significant Differences across units (panel effect) Random regression preferred to OLS
Modified wald test for groupwise heteroskedasticity	Chi2 (31)= 2541.55 Prob > Chi2 = 0.3162	Presence of heteroskedasticity
Wooldridge test for Autocorrelation in panel data	f(1, 30)=33.085 Prof> f =0.4045	No serial Correlation

Source: Computed by authors